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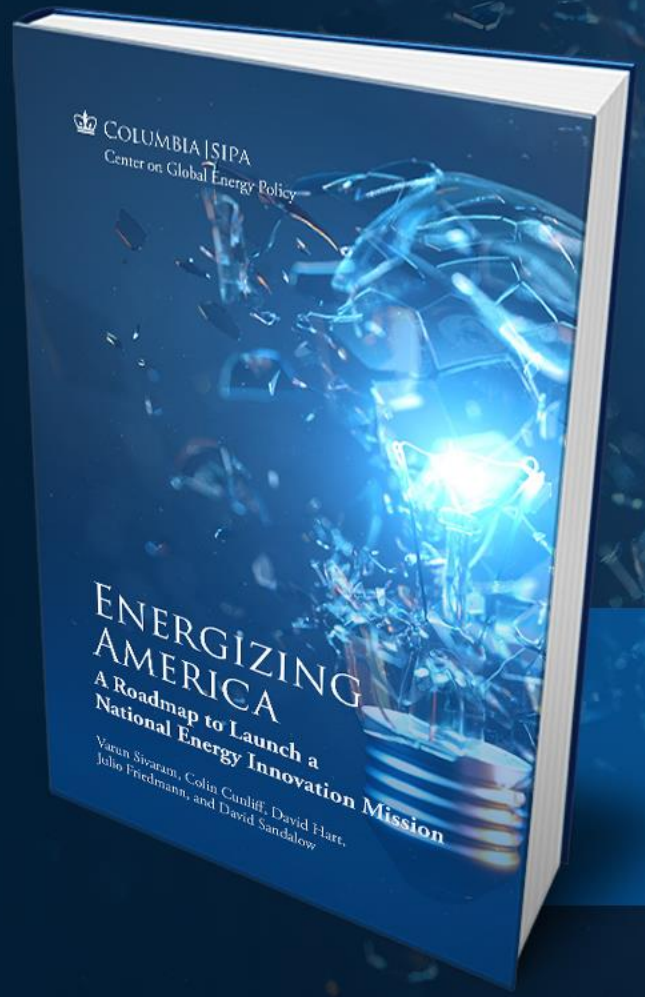


ENERGIZING AMERICA

A Roadmap to Launch a National Energy Innovation Mission

Varun Sivaram, Colin Cunliff, David Hart,
Julio Friedmann, and David Sandalow

"**A plan to make the United States the world leader in clean energy innovation** and rise to an existential challenge – creating exciting new jobs along the way."

—John F. Kerry, 68th US Secretary of State

Bipartisan support is surging for clean energy innovation

DOE energy budgets **have increased by 25%** over the past four years.

Energy Act of 2020 reauthorizes DOE programs, and comprise measures sponsored by **100+ Congressmembers from both parties**

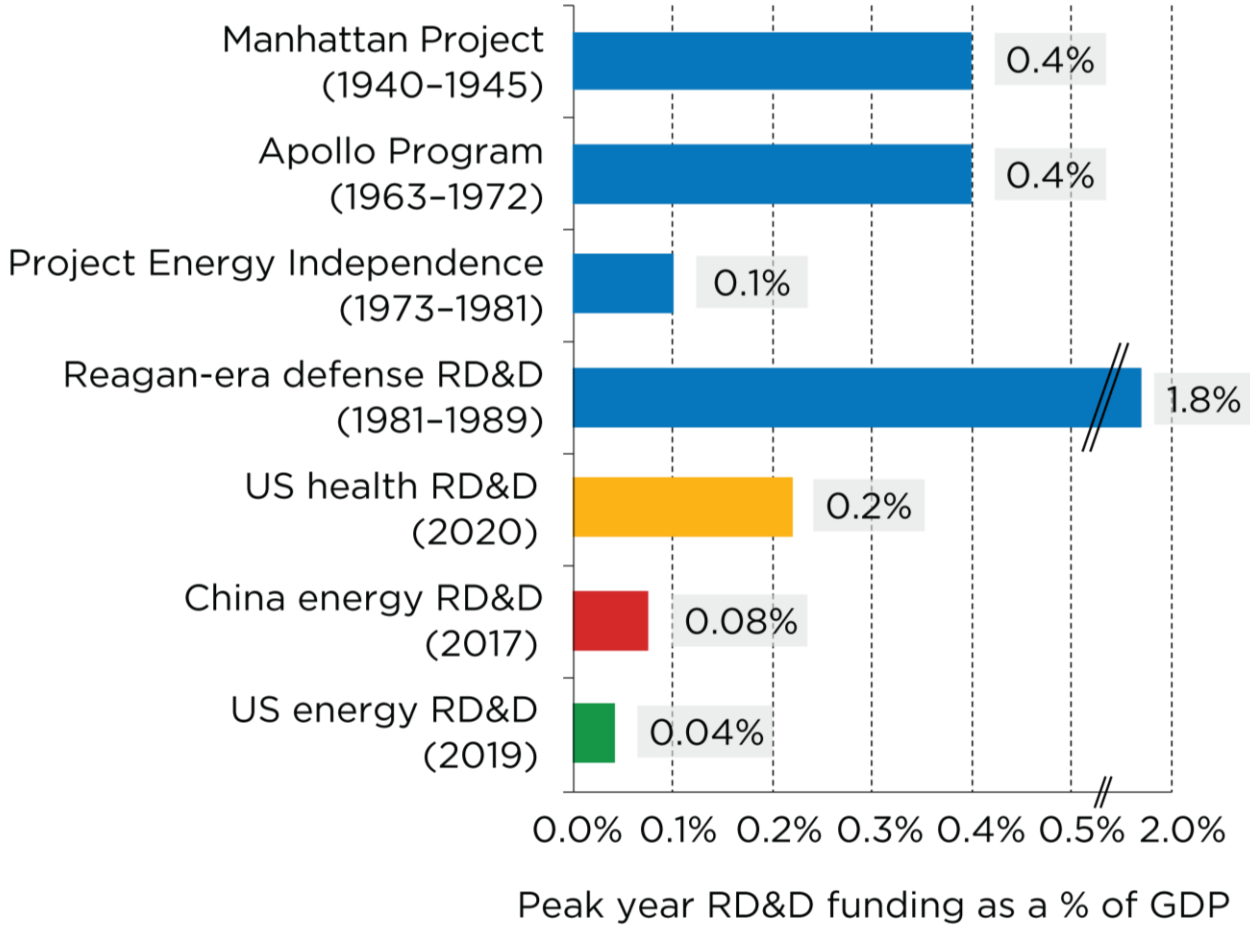
President Joe Biden has pledged to make the **quadruple government-wide clean energy RD&D over four years**.

Federal funding for previous innovation missions has far outstripped this target

Quadrupling federal investment in clean energy innovation **would translate to spending ~0.12% of GDP**

This target is both **ambitious and measured**, to maximize the return on taxpayer investment

Federal RD&D funding as a % of GDP, selected national innovation missions *(Third Way, ITIF)*



Clean energy innovation is needed to accelerate decarbonization

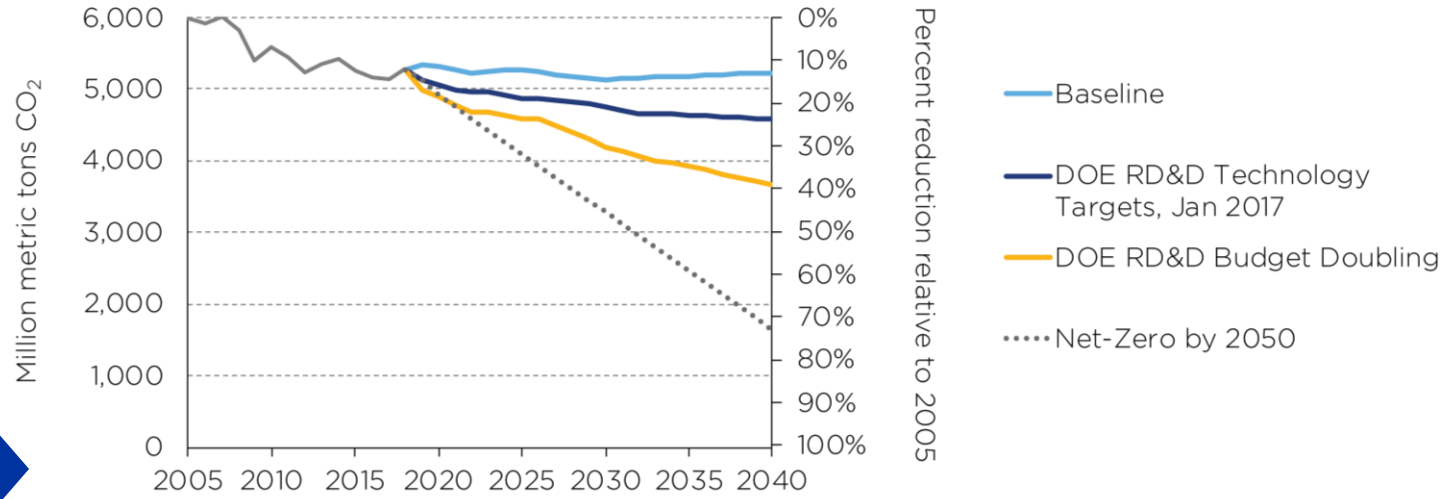
According to the IEA, **40 out of 46** energy technologies to limit warming to 2°C aren't on track

Half of the reductions to swiftly transition to net-zero emissions must come from technologies that haven't reached markets

The most important way the US can speed global climate action is to develop cheaper & better clean energy technologies

Effect of public funding for energy innovation U.S. emissions

(Source: Department of Energy [DOE])



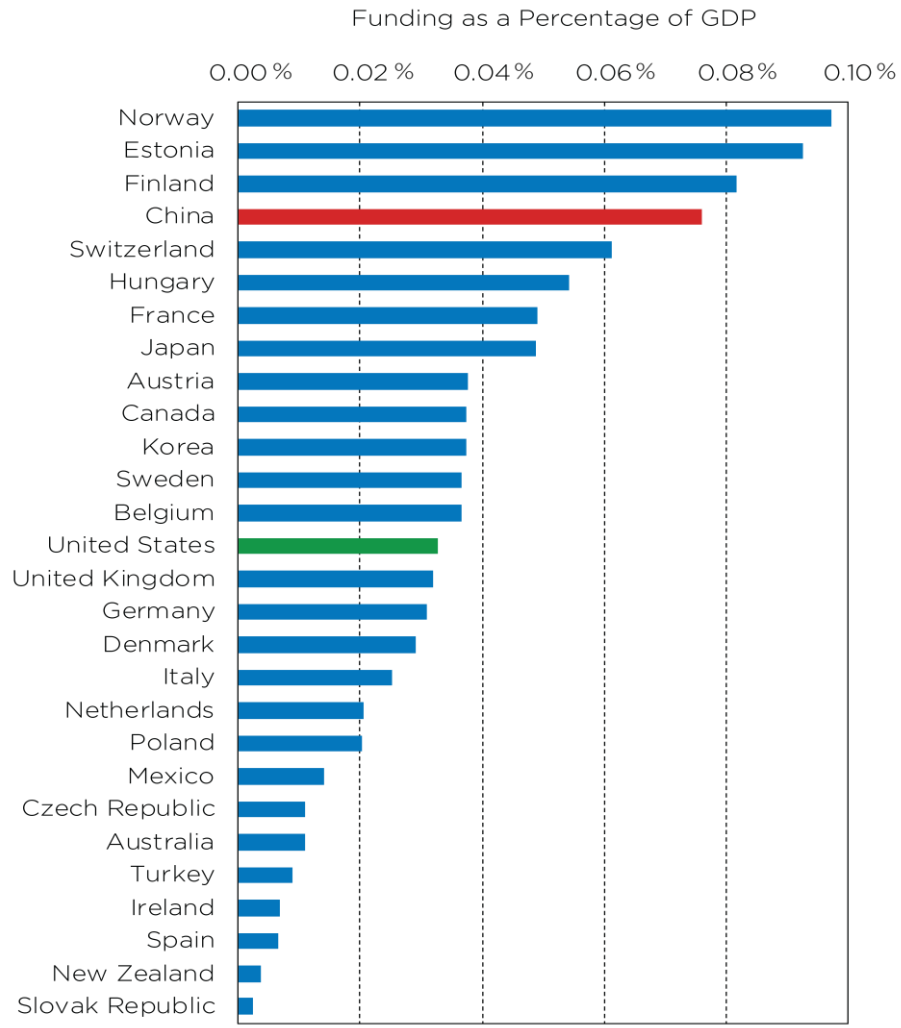
This is a critical moment to build US leadership in new industries

Countries from China to Germany are investing in new energy industries, from EV manufacturing to hydrogen RD&D.

The United States is well positioned to lead (e.g., on CCUS, advanced nuclear, digital energy systems, advanced transportation)

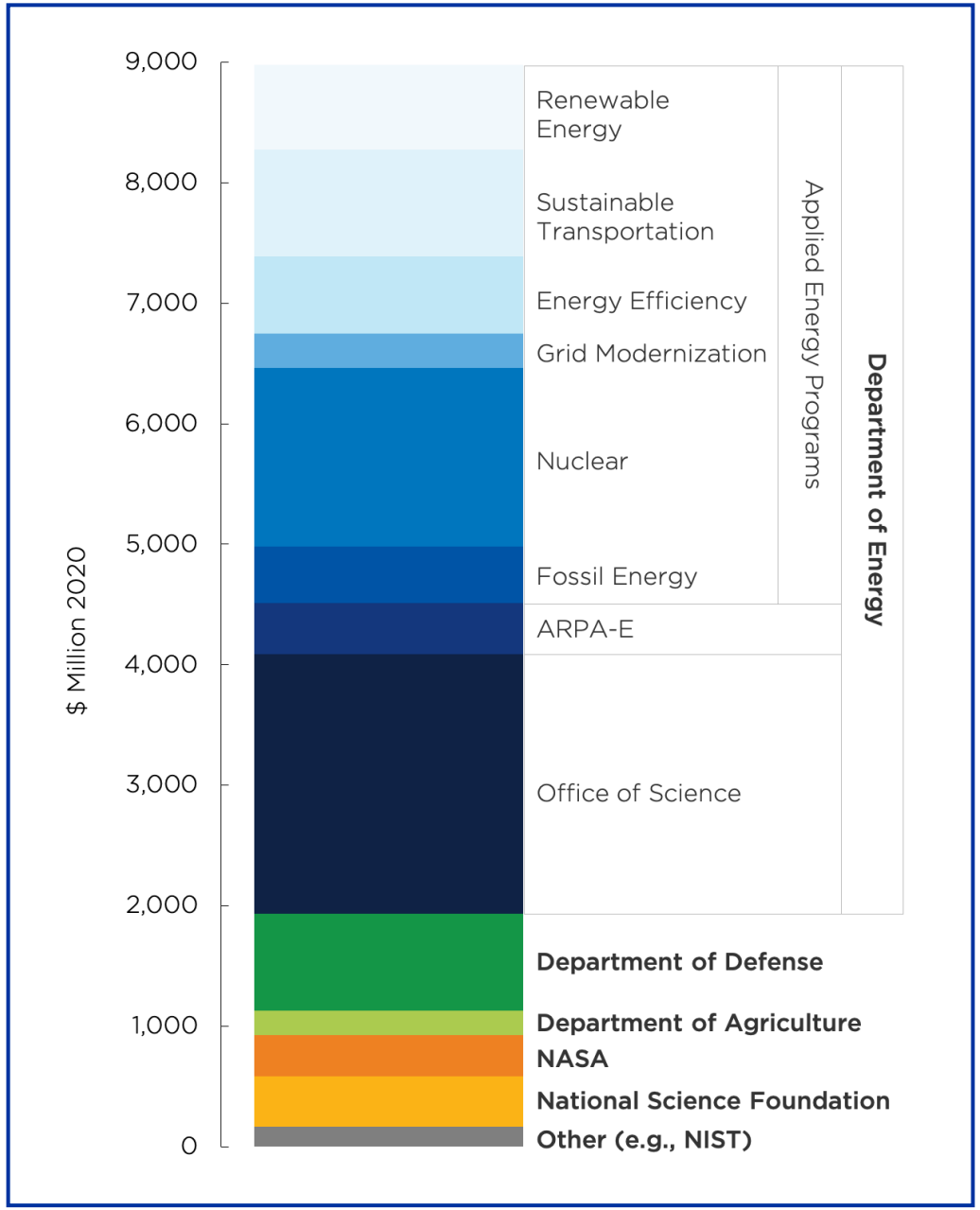
Quadrupling innovation funding could directly and indirectly stimulate **more than one million well-paying US jobs**

Public funding for clean energy innovation as a % of GDP *(Source: IEA)*



To inform our roadmap, we've assembled the most comprehensive database of current US federal government funding for clean energy innovation

U.S. budgeted federal funding for clean energy RD&D in FY20 *(Source: Agency Budgets)*



Strategic and Tactical Guidance to the Next Administration and Congress

Technology Pillars

1	Foundational science & platform technologies
2	Clean electricity generation
3	Advanced transportation systems
4	Clean fuels
5	Modern electric power systems
6	Clean and efficient buildings
7	Industrial decarbonization
8	Carbon capture, use, & sequestration
9	Clean agricultural systems
10	Carbon dioxide removal

Strategic Principles

1	Match the funding portfolio to critical decarbonization needs
2	Support all stages of the innovation pipeline
3	Marshal the full capacity of the federal goverment
4	Harness the innovative capacity of National Laboratories, universities, and the private sector
5	Partner with state & local governments to support regional innovaton
6	Set predictable long-term funding targets, while adapting to new data

Immediate Actions

1	 The President should **launch the National Energy Innovation Mission**
2	 Congress should increase energy RD&D funding by **30% in FY22**
3	 The United States should **reassert international leadership** on energy innovation

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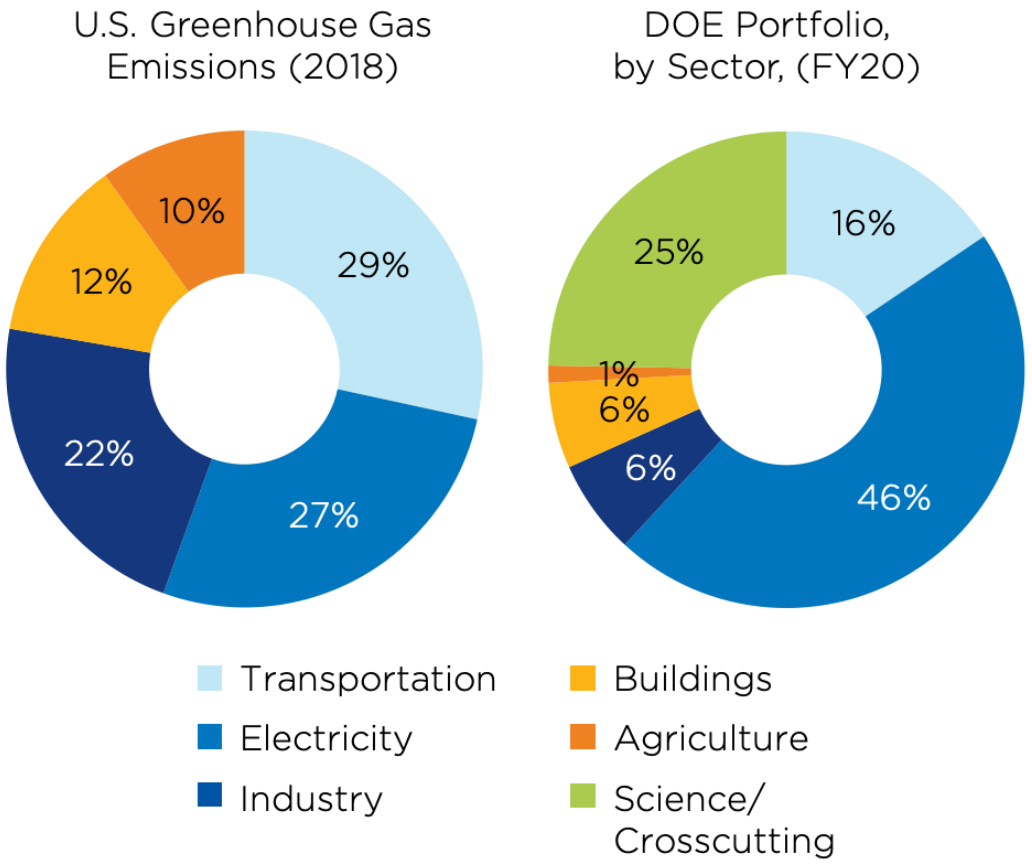
2018 U.S. GHG emissions vs. FY20 DOE clean energy RD&D funding *(Sources: EPA, updated from EFI, 2019)*



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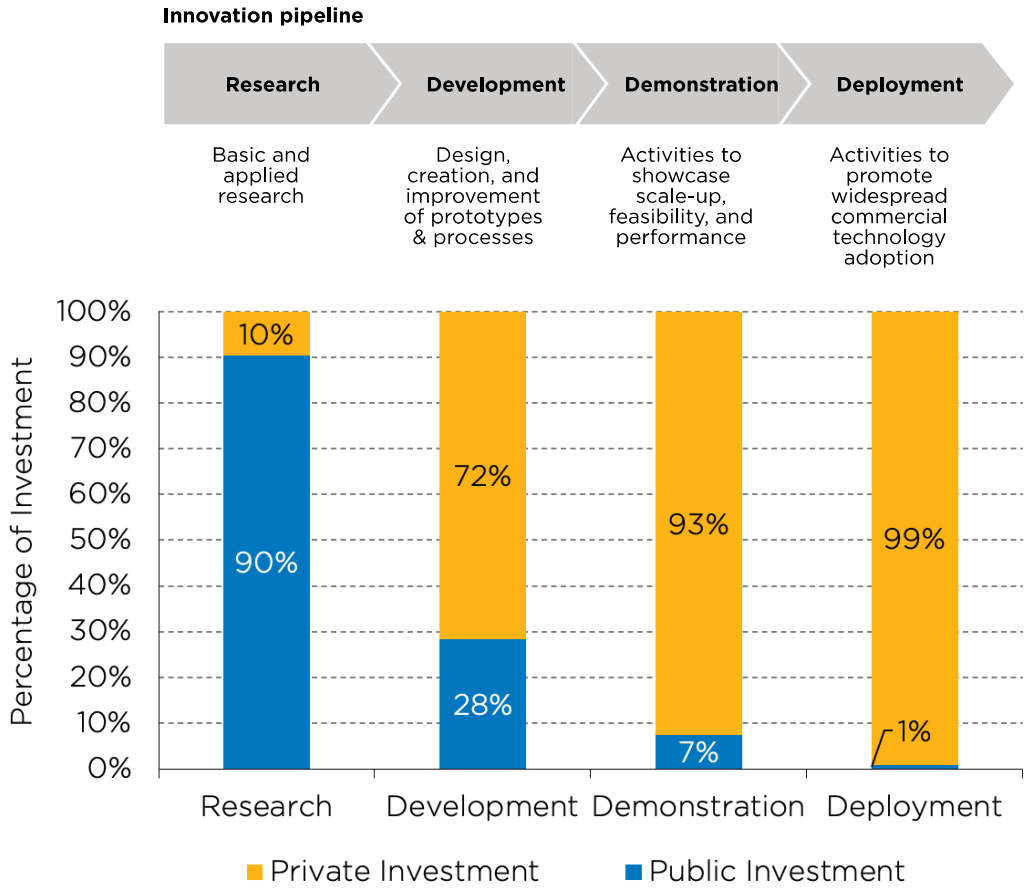
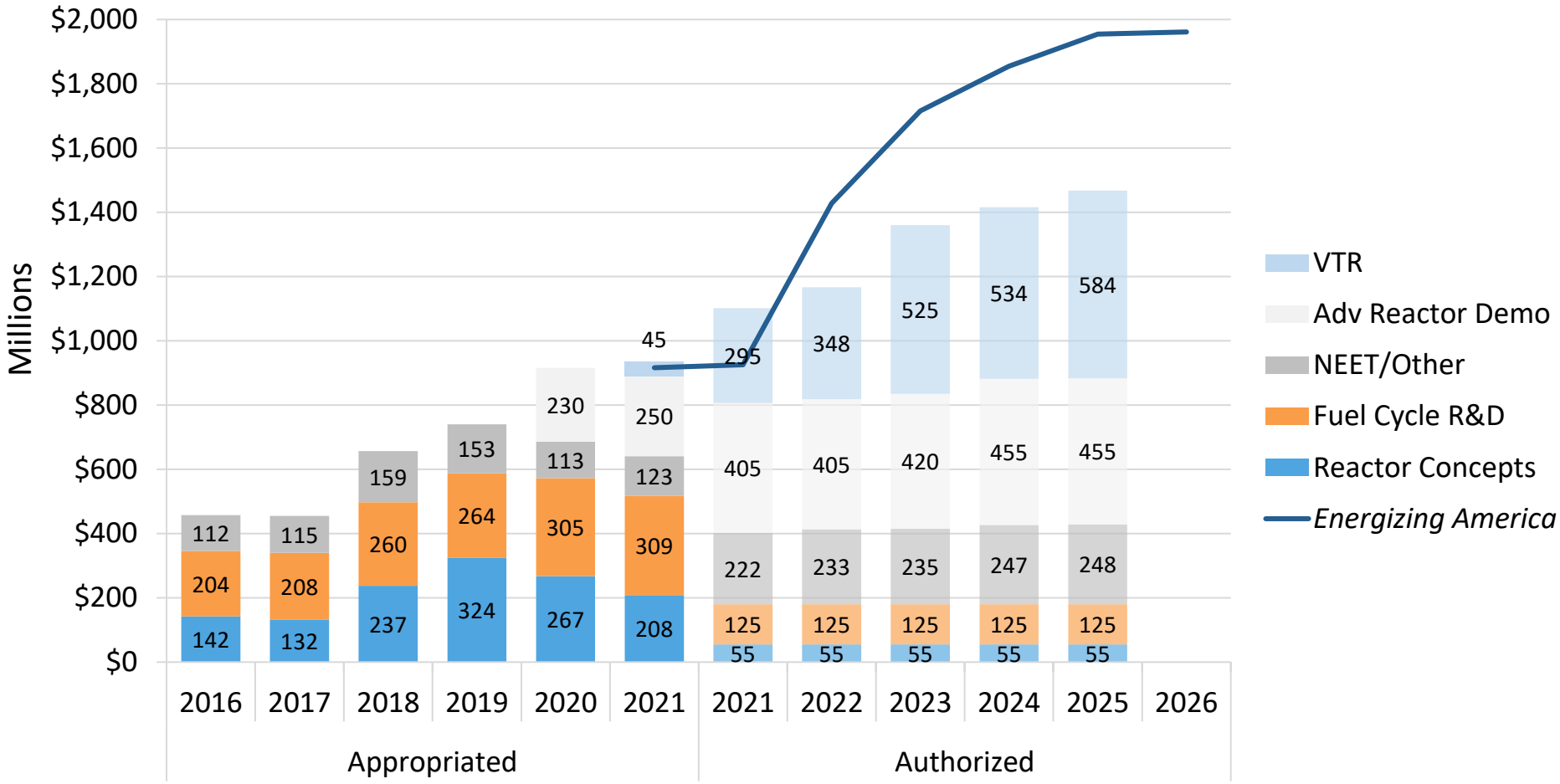
The energy innovation process and sources of U.S. investment by stage in 2016 *(Breakthrough Energy, Energy Futures Initiative, and IHS Markit, 2019)*



Recent developments post-*Energizing America* (Sept 2020)

- **Energy Act of 2020**, December 2020
- **Carbon-Free Technology Initiative**, March 2021
- **Fiscal Year 2022 Budget**
  - **"Skinny" Budget** (2 pgs for DOE), April 2021
  - **Full Congressional Budget Justification** (~3000 pages), June(?) 2021

Energy Act of 2020 makes significant changes to the Nuclear Energy programs at DOE



CARBON-FREE TECHNOLOGY INITIATIVE

Bipartisan Policy Center

C2ES CENTER FOR CLIMATE AND ENERGY SOLUTIONS

CATF CLEAN AIR TASK FORCE

CLEARPATH ACTION

EEI Edison Electric INSTITUTE

GREAT PLAINS INSTITUTE Better Energy. Better World.

ITIF INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

NEI NUCLEAR ENERGY INSTITUTE

THIRD WAY

The Carbon-Free Technology Initiative is focused on implementation of federal policies that can help ensure the commercial availability of affordable, carbon-free, 24/7 power technology options by the early 2030s to help the electric power industry meet net-zero carbon reduction commitments.

www.carbonfreetech.org

CFTI: Policy Recommendations

4 General Categories of Policy Recommendations:

- Research and development (R&D)
- Demonstration
- Deployment
- Commercial ecosystem issues (e.g., siting and permitting).

CFTI: Policy Recommendations

R&D

- Launch a Nuclear Affordability Initiative (modeled after SunShot)
- Bring VTR online by 2026
- Study replacement/repowering of coal-fired power plants with Adv Nuc Reactors

Demonstration

- Multi-year funding for Adv Reactor Demo Program (ARDP)
- Risk reduction awards for phase one ARDP projects

Deployment

- Federal government VPPA of 10-30 years for adv reactors
- Contract for difference (CfD) or VPPA for wholesale markets
- Extend tax credits for advanced reactors through 2035
- Support HALEU fuel market

Commercialization

- Additional funding to NRC for advanced reactor licensing

Further reading:

- Energizing America, bit.ly/energizingamerica
- ITIF FY22 Energy Budget report *(May 2021)*, itif.org/energy-budget

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Energy Innovation in the FY 2021 Budget: Congress Should Lead

BY COLIN CUNLIFF | MARCH 2020

Congress should make energy innovation a national imperative, and at least double U.S. investment in clean energy RD&D by 2025.

As it has in the past three budget cycles, the Trump administration has once again proposed massive cuts to energy research, development, and demonstration (RD&D), placing the administration's budget request in tension with bipartisan congressional efforts to reinvigorate the national energy innovation system.[1] Fortunately, Congress has soundly rejected the administration's previous budget proposals in this area, instead putting forward a positive vision for American innovation that invests in a future of clean, reliable, low-cost energy. Congress has also produced a strong slate of bipartisan, bicameral authorizing bills that would accelerate innovation if backed by significant new funding commensurate with the challenge.[2] Congress should keep up the momentum of the past three fiscal years and continue to elevate clean energy innovation as a national priority.

The administration's latest budget request would slash federal investments in the Department of Energy's (DOE) applied energy programs—including energy efficiency, renewable energy, sustainable transportation, fossil energy, nuclear energy, and grid modernization—by more than 44 percent, from $5.4 billion in FY 2020 to $3.0 billion in FY 2021. Popular and effective initiatives including the Advanced Research Projects Agency-Energy (ARPA-E), Title XVII loan guarantee program, and advanced vehicles manufacturing loan program would be eliminated. Even the basic energy-related research within the DOE Office of Science (SC)—which includes programs in fusion, bioenergy, and basic energy sciences, and falls squarely within the definition of "early stage research"

Thank You!

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